the ship of war; then the wounded can be carried in their service cots and stretchers across a gangway to their beds. This, however, is rarely possible, and the services of the hospital carrier are called in as a go-between. In this case the wounded man is taken in his cot or stretcher and placed in the tray or cot carrier and hoisted out by means of a derrick into a hospital boat or barge, which transports him to a hospital ship, an ambulance train, or a local hospital, as circumstances command. The chief point to be remembered is that the less a wounded or burnt man is moved the better his chances of recovery.

Since the outbreak of hostilities the hospital ships have borne the brunt of the medical work in the fleet. The extreme undesirability of making preparation for action with several bed cases, whether medical or surgical, on board the fighting ship is evident. Cases of sickness or injury, if likely to be under treatment more than a few days, are therefore transported to the local naval hospital or hospital ship.

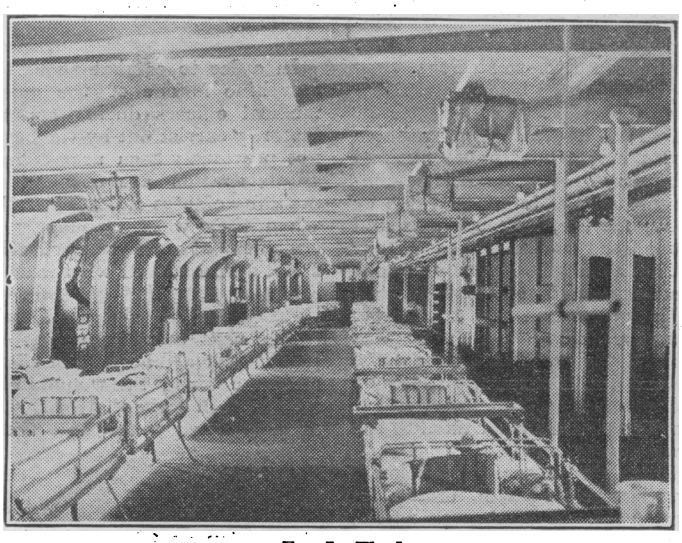

FIG. 7.—Ward.

HOSPITAL SHIPS.

BY
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BEFORE the war there was only one British hospital ship in commission, the *Maine*, which was originally fitted out by a group of American ladies during the South African war and subsequently taken over by the Admiralty. Unfortunately this vessel went ashore in a thick fog on June 19th, 1914, and was lost, but the arrangements for the provision of sufficient hospital ships for the fleet previously made by the Admiralty worked admirably. Within four days of the order to mobilize for war three ocean liners were converted into hospital "carriers," and with their medical and nursing staff, and full equipment of cots, bedding, and medical and surgical stores complete, which had been kept ready in a lay-apart store at one of the large medical dépôts, were at sea, where any necessary alterations were completed by the artisan ratings, so that they joined up with the fleet ready for any emergency.

In the meantime work was being pressed forward in six other ships intended for more permanent service from plans which had already been prepared during peace, so that they were ready for sea in about three weeks or less. These vessels were mostly intermediate liners, in which the passenger accommodation and cargo space were easily adapted to their new purpose. The swinging cots fitted averaged about 220, but additional emergency accommodation was provided for about 300 more patients. In the Mediterranean this number was sometimes largely exceeded, over 900 cases being conveyed to a base hospital on one occasion.

As a rule there are six or seven wards for men (Fig. 7) and two or three for officers, which were adapted by converting portions of the saloons or removing cabin bulkheads, some officers being also nursed in cabins. A padded room for mental cases was also prepared. The decks are covered with green corticine, which is easily kept in a high state of polish; the bulkheads and cots are enamelled a very light green. Ventilation is maintained by means of scuttles, supply and exhaust cowls, and special motor-driven supply ventilators. The wards occasionally became rather hot at night when dead-lights had to be closed; but this was corrected by Fleet Surgeon M. H. Knapp's plan of fitting the cylindrical portions of ordinary wind scoops with partial diaphragms which occupy about two-thirds of the circumference, so that while air is freely admitted no light shows through. Other alterations included the fitting up according to the existing plans of dispensaries, pantries, latrines, mortuary, disinfector for clothes and bedding, cot lifts both inside and outside the ship, *x*-ray room, laboratory, laundry, operating rooms, and many other necessary adjuncts of a self-contained hospital. These necessary fittings had also all been stored in readiness before mobilization.

The operating theatres are installed either in music rooms or saloons, or in specially constructed erections on the upper deck (Fig. 8). In the former case the somewhat ornate walls are covered in with match-boarding enamelled white. The rooms are divided into two parts with separate entrances and sliding doors between—one half being used as a preparation and sterilizing room. The decks are tiled and all the tables, shelves, and other structural arrangements are of the aseptic pattern. In spite of their extemporized character, it does not appear that any case of sepsis could be definitely attributed to faulty surroundings.

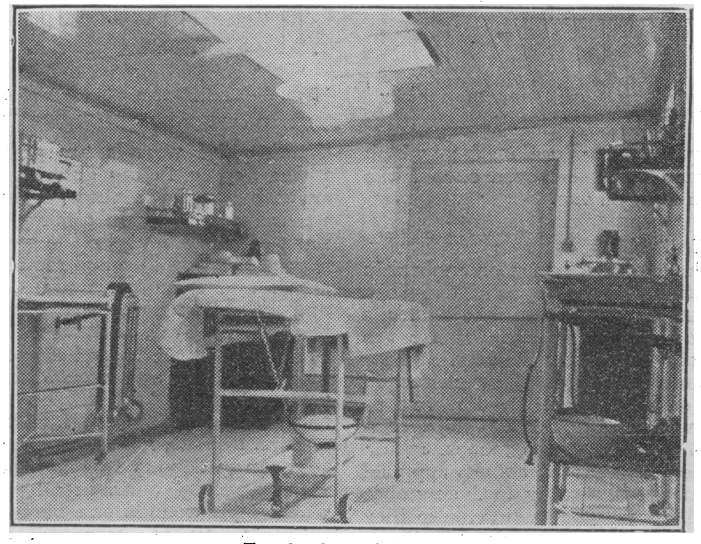

FIG. 8.—Operating room.

The cot-lifts which serve the wards are placed near the operating rooms so that the exposure of a patient after anaesthesia is reduced to a minimum. The original supply of instruments and medical and surgical stores met the initial requirements; but subsequently, as it became necessary, further equipment was provided by the Admiralty.

General Duties.

On the Home Station the work of the hospital ships is to a large extent similar to that carried out by the *Maine* in peace time. The Fleets at their different bases—often in remote districts where no shore accommodation is available—are attended by one or more ships. When nearly full they are either cleared by smaller hospital ships which convey the patients to a convenient rail-head for further transference by ambulance train, or at stated

intervals the hospital ships are relieved by others, steam to a railhead to discharge their cases, and are then coaled, provisioned, and if necessary repaired or refitted.

It soon became evident that any preconceived ideas of hospital ships proceeding to the scene of an action had to be discarded. Apart from the difficulties of transporting wounded men from the fighting ships in bad weather at sea it was obvious that the conditions of modern naval warfare precluded these ships from remaining with their engines stopped without running grave risk of being torpedoed by submarines.

Embarkation.

In harbour the conveyance of patients is carried out by converted drifters or in ships' picket boats and cutters. Some of the former are fitted to take eighteen cot cases under cover, and in bad weather are far preferable to ships' boats. On arrival alongside, the cots are hoisted in, by hydraulic or steam cranes, in a tray which would take either a service cot or a stretcher (Figs. 9, 10, 11). The original trays were gradually improved upon, and were fitted with a removable end or side, whereby the process of transfer is much facilitated. When comparatively large numbers of men wounded in action have been brought in by destroyers and light cruisers, it has been found quite possible to get these vessels alongside the hospital ship, which considerably accelerates the transfer.

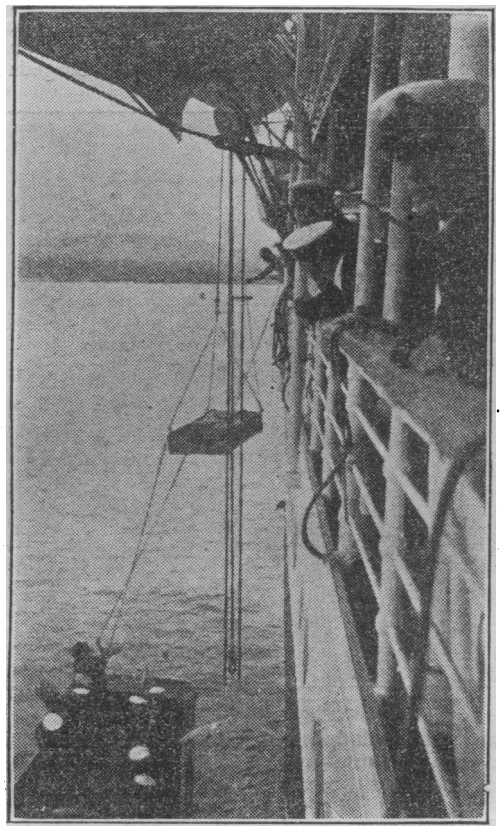

FIG. 9.—Cot case coming on board from a ship's boat.

Opinions differ as to what class of cases should be dealt with by hospital ships after an action and what transferred further by ambulance train. There is much to be said for the view that the very severely wounded and those suffering from much shock are more satisfactorily dealt with in the former. The transference from a fighting to a hospital ship is accomplished with the minimum of disturbance; and, as now equipped, these ships are capable of dealing with anything. After the Jutland battle there was a considerable number of patients with severe burns who certainly could not have borne a long train journey; their care entailed heavy work on the staffs of the ships which received them. It must be borne in mind, however, that when cases on board hospital ships that can travel by train are retained, there are no means of dealing with a fresh lot of wounded that may come in at any time. The hospital ship is, in fact, demobilized *pro tem.*, a most undesirable proceeding.

Staff.

The medical staff consists of one fleet surgeon in charge, six other medical officers, and a dental surgeon. A chaplain also is borne. The surgeons in the first instances, in addition to active service medical officers, were drawn from the

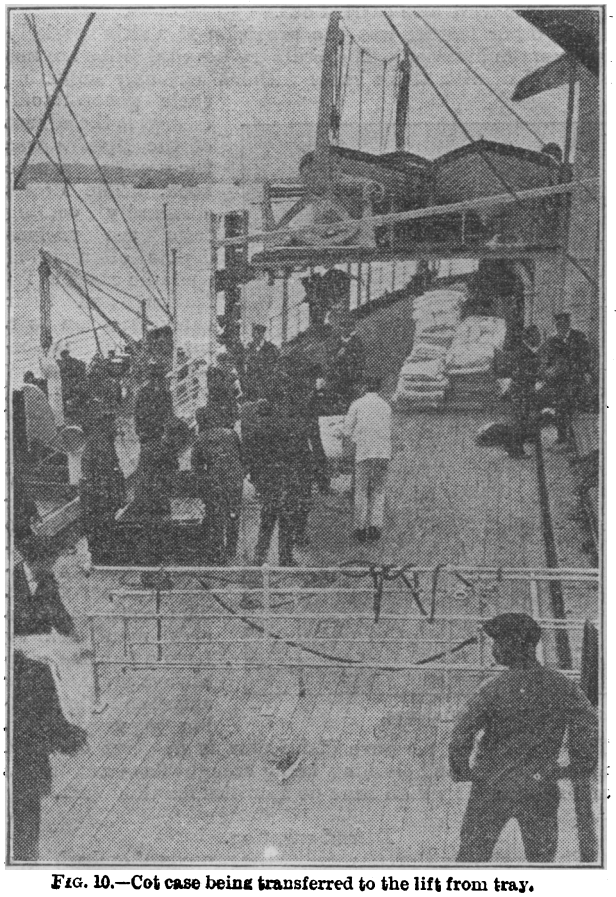

FIG. 10.—Cot case being transferred to the lift from tray.

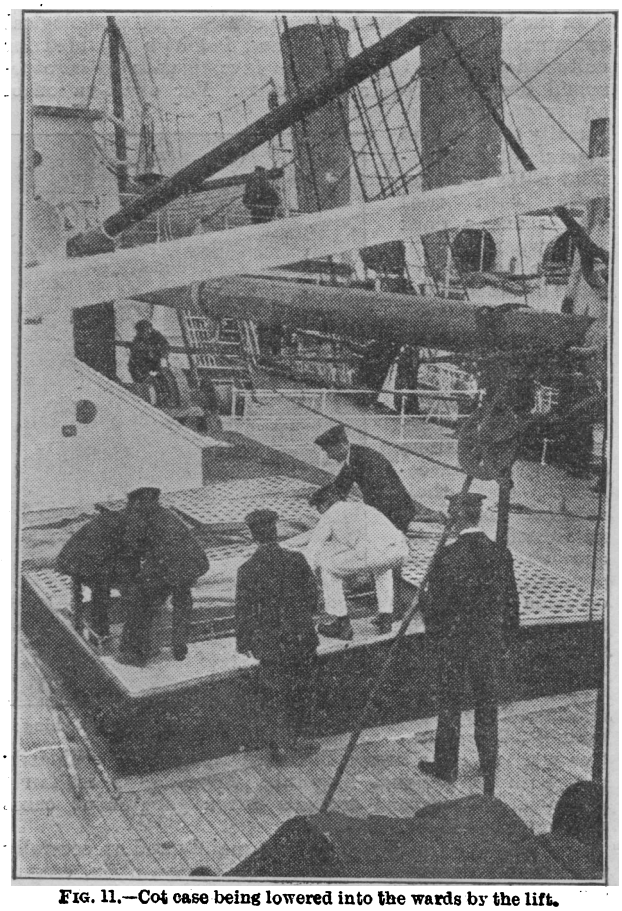

FIG. 11.—Cot case being lowered into the wards by the lift.

Royal Naval Volunteer Reserve, amongst whom were many holding honorary hospital appointments in civil life. Extremely valuable services were rendered by these officers, among whom were bacteriologists, ophthalmic surgeons, and *x*-ray experts. As time went on, special departments were gradually developed, with the result that a degree of efficiency has been obtained remarkable for a floating hospital.

The nursing staff consists of four Royal Naval or Reserve Nursing Sisters, and some thirty-five men, of whom about one-third belong to the regular Naval Sick Berth Staff and the remainder to the Reserve. The latter, drawn mainly from mining and manufacturing districts, were well trained in ambulance work, but as their nursing capabilities were naturally of a less high order, much responsibility fell upon the Sisters, who have admirably justified their calling. The remainder of the complement includes carpenter ratings, master-at-arms, and ship's corporals for baggage and police duties, writer, and signalman.

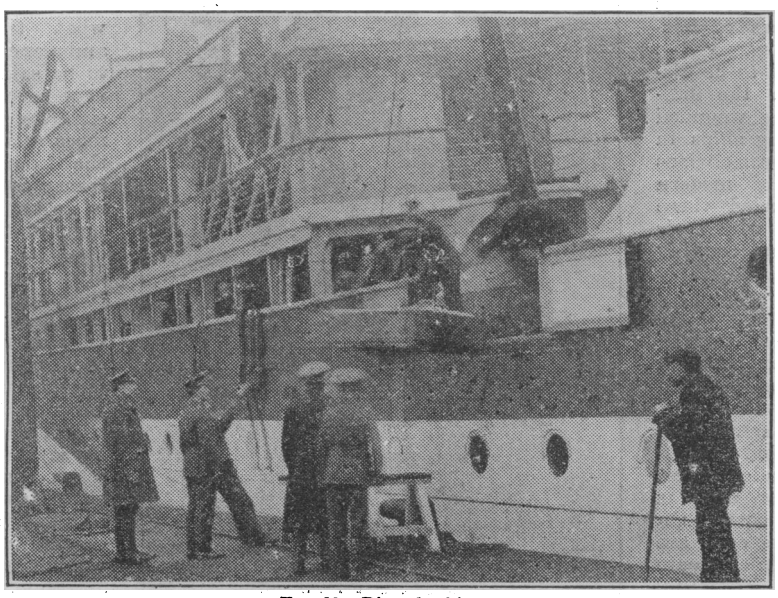

FIG. 12.—Disembarking

Improvements are constantly made in these ships; for instance, in the *x*-ray room of the *Garth Castle* aërial leads were installed, viewing boxes and adjustable carriers for water-cooled tubes made, and many other accessories fitted up by the ship's artisans and electrician under the supervision of the surgeon in charge of the department.

In the laboratory the ordinary clinical and pathological examinations are carried out, and facilities provided for culture work and the thorough investigation of cerebro-spinal fever contacts and carriers. For examination of acuity of vision, especially that of gun layers, all the hospital ships are provided with trial glasses and a dark room, where an ophthalmic surgeon or other member of the staff with a good working knowledge of sight testing and retinoscopy is always available. Among the temporary surgeons there are several gynaecologists, and their surgical experience is turned to good account on more general lines. On one occasion a successful Caesarean section was performed in a remote district where no other professional aid was obtainable. The operative work is often heavy, the cases being those ordinarily met with in a naval hospital. Appendicitis is fairly common, and on one occasion seven gangrenous cases were operated upon in one day.

FIG. 13.—Disembarking: Removal to Motor Ambulance.

In the *Garth Castle* iodine was mainly and successfully used for the cleansing of wounds, skin preparation, catgut, etc. Hypertonic saline solution was also much in vogue, both for arm and leg baths and as a dressing. The formula used was a solution containing 0.85 per cent. sodium chloride with 0.25 per cent. of sodium citrate. The results obtained were excellent; septic wounds and burns became clean and healthy in a wonderfully short space of time. Fleet Surgeon A. R. Bankart's apparatus for obtaining a solution containing free chlorine by the electrolysis of sea water proved quite efficacious.

The dental surgeons are always busy, and are of immense service to the personnel of the Fleet. At one time there were three of these officers living in the hospital ship at a certain base, the foremost operating and preparation rooms being given up to them. The equipment supplied is very complete.

Two features were introduced which proved of the greatest benefit to the Fleet. The first was the systematized use of galyl in all hospital ships. At first patients requiring this treatment were sent to the South of England, occupying valuable beds in hospital carriers and trains, and their services were lost for a considerable period. Later on such patients were sent to the hospital ships for two or three days, the injection was given, the particulars entered in their special history sheets, and they then returned to duty until due for their next dose. Whatever hospital ship was present then carried on the treatment, with resulting economy of time, money, and service. Systematic examinations of the urine for arsenic were also carried out.

The other feature was the provision of a ship specially for zymotic diseases. The ordinary hospital ships are not able to deal with these cases without seriously impairing their general efficiency, so the advent of the *Agadir* was the greatest possible boon. The drafts constantly coming from the various dépôts often bring sporadic cases of infection, and their early isolation is a matter of importance. The laundry and disinfecting plant are two other items in constant request. Clean bed linen and patients' clothing went far towards giving the ships their reputation for always looking fresh and sweet. The contrast to a sick man coming from a fighting ship always prepared for action and often coaling is very great. The large high pressure disinfector is in great demand, much bedding and clothing being brought from auxiliaries and small craft which have no facilities for this work.

Disembarkation.

This is simply the converse of the process of embarking a considerable number of cases. As has already been stated, it is done in two ways—that is, either by discharging

to a smaller hospital ship which came alongside or by the ship herself proceeding to a port with rail facilities. In the latter case, the number and class of cases having previously been telegraphed, a fleet of motor ambulances and baggage lorries is in attendance on the jetty as soon as the ship is tied up. The clerical work, sorting of baggage, labelling for the different base hospitals, etc., has all been completed on the voyage, so that little time is spent over the actual disembarkation. The requisite number of cots are placed in readiness in each ward, and the patients who are unable to walk placed in them. Baggage and walking cases are got out first, the latter proceeding down a brow or the ship's gangway ladder. The cot cases are then brought up in rapid succession in the lifts, transferred to the tray, and hoisted out. Padded trestles are placed on the jetty to receive the tray, and the cots are transferred to the waiting ambulances (Figs. 12, 13). The canvas cots are uniform and interchangeable with those of the ambulance train, so that there is no further disturbance of the patient, the same number of empty cots being received from the train.

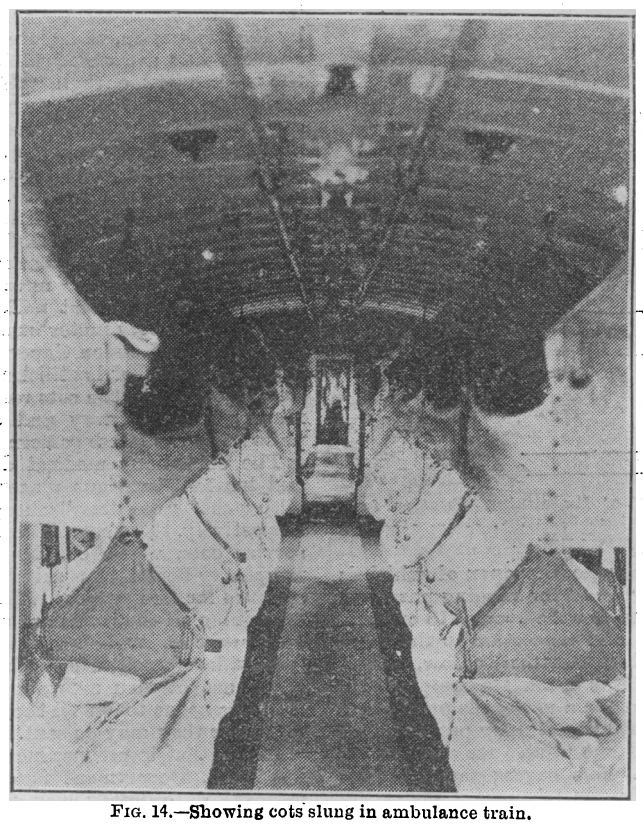

FIG. 14.—Showing cots slung in ambulance train.

The Naval Medical Transport Department now takes charge of the cases, so that when the last patient and kit-bag are over the side the professional work of the ship ceases for a short space, and a proportion of the staff are enabled to get well-earned leave as the last weeks of the round trip are always strenuous.

ACCOUNT OF LAND MEDICAL TRANSPORT ARRANGEMENTS OF THE NAVY.

BY

Surgeon General SIR JAMES PORTER, K.C.B., K.C.M.G. M.D., R.N.,

AND

Staff-Surgeon A. VAVASOUR ELDER, R.N.V.R.

THE removal of sick and wounded from the scenes of their activities to the seclusion of a hospital is no small factor in the general work of the Medical Department of the Navy.

To deal with this phase of medical work a special medical transport organization has been created. There is a central office at the Admiralty for the Principal Medical Transport Officer, and thus in immediate touch with the department. Medical Transport Officers are established at the chief naval ports, and finally Assistant Medical Transport Officers have been appointed at all places round the coast where wounded are likely to be landed after action. At each of these places provision has been made for establishing dressing stations and temporary hospital accommodation for a certain number of cases until such time as an ambulance train can be sent to remove them to base hospitals elsewhere.

One of the difficulties of the problem of dealing with naval cases after action is the impossibility of arranging in advance or foretelling exactly at which spot and in what numbers wounded will be landed. Certain obvious bases, it is true, exist, to which ships able to do so would naturally return after an action. But at the same time these bases are wide apart, leaving large gaps of coast line with many ports, into any one of which rescue vessels and smaller damaged vessels might be compelled to enter and discharge their wounded. Hence the establishment of what are termed emergency medical dépôts, with Medical Transport Officers in charge of each at various places along the coasts. Thus no likely place is left without means of coping with a sudden inrush of wounded and rendering medical aid to them.

Briefly, from the time a wounded man is landed from a ship until he is finally placed in hospital, he is in the charge of the Land Medical Transport branch of the Naval Medical Service. The system adopted by the Navy differs from others in so far that when a man is wounded severely enough to require immediate treatment in bed, after having received medical attention, he is, so to speak, put to bed in

FIG. 15.—Showing method of carrying cot. Summer dress.

FIG. 16.—Showing method of carrying cot. Winter dress.